Editorial

# The use of long-term datasets for informing and evaluating air quality policy initiatives

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Political institutions generally desire to use the best available scientific evidence when formulating policy. In South Africa, the declaration of the Priority Areas where 'ambient air quality standards are being, or may be, exceeded' (according to the National Environmental Management: Air Quality Act, 2004) is an example of a policy initiative that was prompted by quantitative evidence – measurements of ambient air pollution levels. National Priority Areas have been declared in the Vaal Triangle in 2006, in the Highveld in 2007 and in the Waterberg-Bojanala region in 2012.

The Department of Environment, Forestry and Fisheries (DEFF, formerly the Department of Environmental Affairs) established a network of 6 ambient air quality monitoring stations in the Vaal Triangle and 5 monitoring stations in the Highveld Priority Area to inform the emission reduction strategies and track progress in reducing ambient pollution levels. The summarised data from these monitoring stations is presented annually by the National Air Quality Officer in the State of the Air Report. In this issue of the Clean Air Journal, there are two papers (Feig et al., 2019 and Govender and Sivakumar, 2019) that have subjected the 10+ years of data from these monitoring stations to more rigorous trend analysis, which allows reflection on progress made to date and future regulatory priorities.

Govender and Sivakumar (2019) analyse long-term changes in $PM_{2.5}$ and $O_3$ concentrations in the Vaal Triangle Airshed Priority Area, while Feig et al. (2019) examine trends in $PM_{10}$, $PM_{2.5}$ and $SO_2$ in the Vaal Triangle Airshed and Highveld Priority Areas. For both studies, the ambient air quality data was extracted from the South Africa Air Quality Information System (SAAQIS) database and Theil-Sen trend analysis was performed using the Open Air Package in R (in addition to other analyses).

The results of these studies show that there is still widespread non-compliance with ambient particulate matter levels in the Vaal Triangle and Highveld Priority Areas (there is non-compliance with the annual ambient $PM_{10}$ standard at seven of the eleven monitoring stations and non-compliance with the annual average $PM_{2.5}$ standard at eight of the eleven monitoring stations (Feig et al., 2019)). There are significant downward trends at most of the monitoring stations, however ($PM_{10}$ and $PM_{2.5}$ concentrations are declining at eight and nine of the eleven sites, respectively (Feig et al., 2019)). The annual rate of decline is generally small, ranging between 1 and 5 μg/m$^3$/year.

$SO_2$ is not a variable of concern in the Priority Areas (except for at eMalahleni) (Feig et al., 2019), but $O_3$ is of concern in the Vaal (Govender and Sivakumar, 2019). Perhaps surprisingly, Feig et al. (2019) demonstrate that ambient $SO_2$ levels in the Priority Areas are lower than $SO_2$ levels in the large South African metropolitan centres in the 1960s.There is a statistically significant increasing trend in $O_3$ concentrations at two of the six monitoring sites, and no significant trends in monthly $O_3$ concentrations at the other four sites in the Vaal (Govender and Sivakumar, 2019). Since $O_3$ is a secondary pollutant, there is a need to understand the emission and transport of precursors in order to design effective initiatives to reduce ambient $O_3$ levels.

These studies demonstrate the value of long-term datasets, noting that there needs to be high data availability (ensured through regular calibration and maintenance), quality control of the data (in this case by both the network operators and the authors of the papers) and data archiving in a way that is easily accessible to all who have an interest in the data.

## References

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